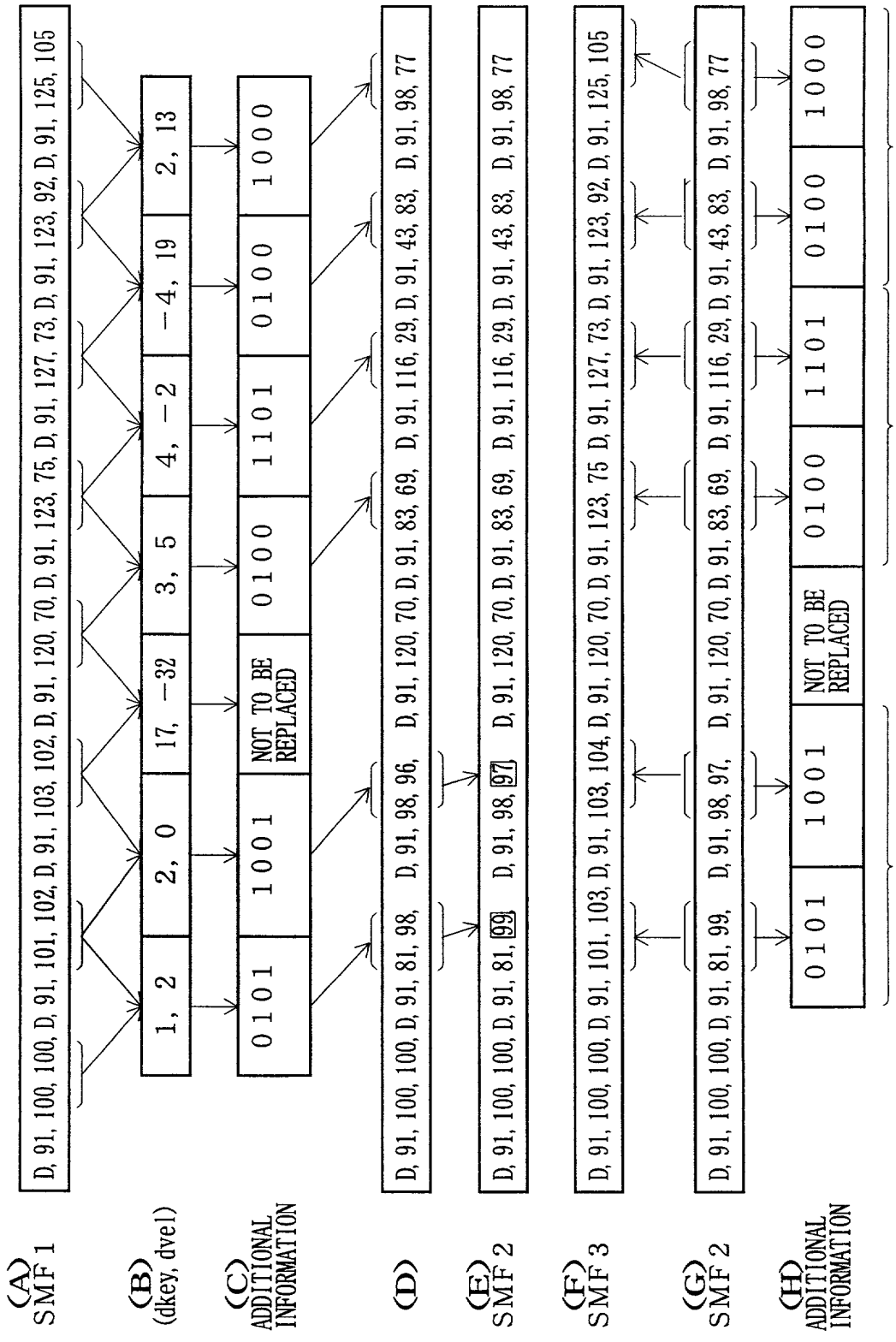
(A) SMF 1
D, 91, 100, 100, D, 91, 101, 102, D, 91, 103, 102, D, 91, 120, 70, D, 91, 123, 75, D, 91, 127, 73, D, 91, 123, 92, D, 91, 125, 105
(B) (dkey, dvel)
1, 2
2, 0
17, −32
3, 5
4, −2
−4, 19
2, 13
(C) ADDITIONAL INFORMATION
0 1 0 1
1 0 0 1
NOT TO BE REPLACED
0 1 0 0
1 1 0 1
0 1 0 0
1 0 0 0
(D)
D, 91, 100, 100, D, 91, 81, 98, D, 91, 98, 96, D, 91, 120, 70, D, 91, 83, 69, D, 91, 116, 29, D, 91, 43, 83, D, 91, 98, 77
(E) SMF 2
D, 91, 100, 100, D, 91, 81, 99 D, 91, 98, 97 D, 91, 120, 70, D, 91, 83, 69, D, 91, 116, 29, D, 91, 43, 83, D, 91, 98, 77
(F) SMF 3
D, 91, 100, 100, D, 91, 101, 103, D, 91, 103, 104, D, 91, 120, 70, D, 91, 123, 75 D, 91, 127, 73, D, 91, 123, 92, D, 91, 125, 105
(G) SMF 2
D, 91, 100, 100, D, 91, 81, 99, D, 91, 98, 97, D, 91, 120, 70, D, 91, 83, 69, D, 91, 116, 29, D, 91, 43, 83, D, 91, 98, 77
(H) ADDITIONAL INFORMATION
0 1 0 1
1 0 0 1
NOT TO BE REPLACED
0 1 0 0
1 1 0 1
0 1 0 0
1 0 0 0
Y
M
H

FIG. 1

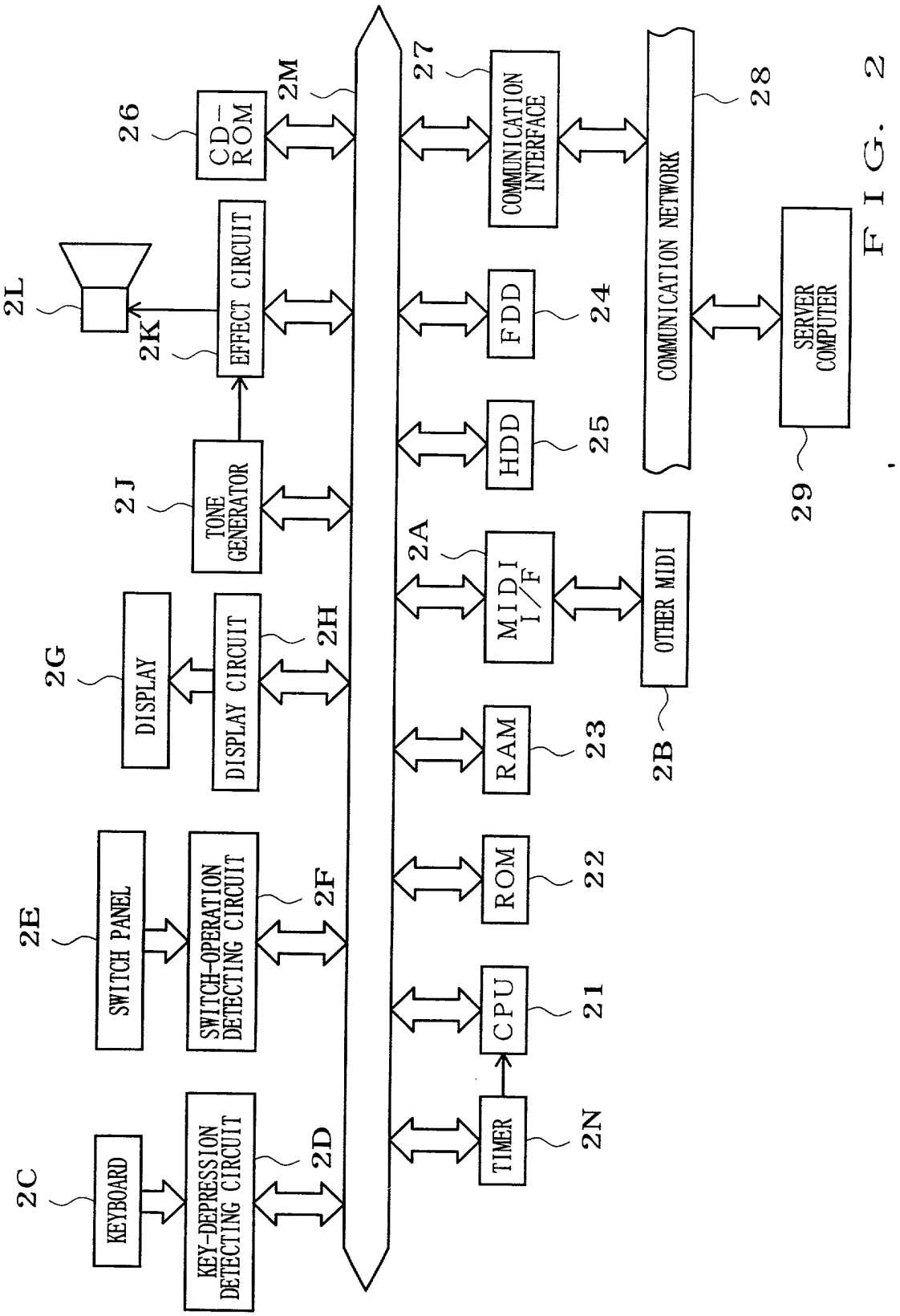
2C
KEYBOARD
2D
KEY-DEPRESSION DETECTING CIRCUIT
2E
SWITCH PANEL
2F
SWITCH-OPERATION DETECTING CIRCUIT
2G
DISPLAY
2H
DISPLAY CIRCUIT
2J
TONE GENERATOR
2K
EFFECT CIRCUIT
2L
26
CD-ROM
2M
2N
TIMER
21
CPU
22
ROM
23
RAM
2A
MIDI I/F
2B
OTHER MIDI
25
HDD
24
FDD
27
COMMUNICATION INTERFACE
28
COMMUNICATION NETWORK
29
SERVER COMPUTER

FIG. 2

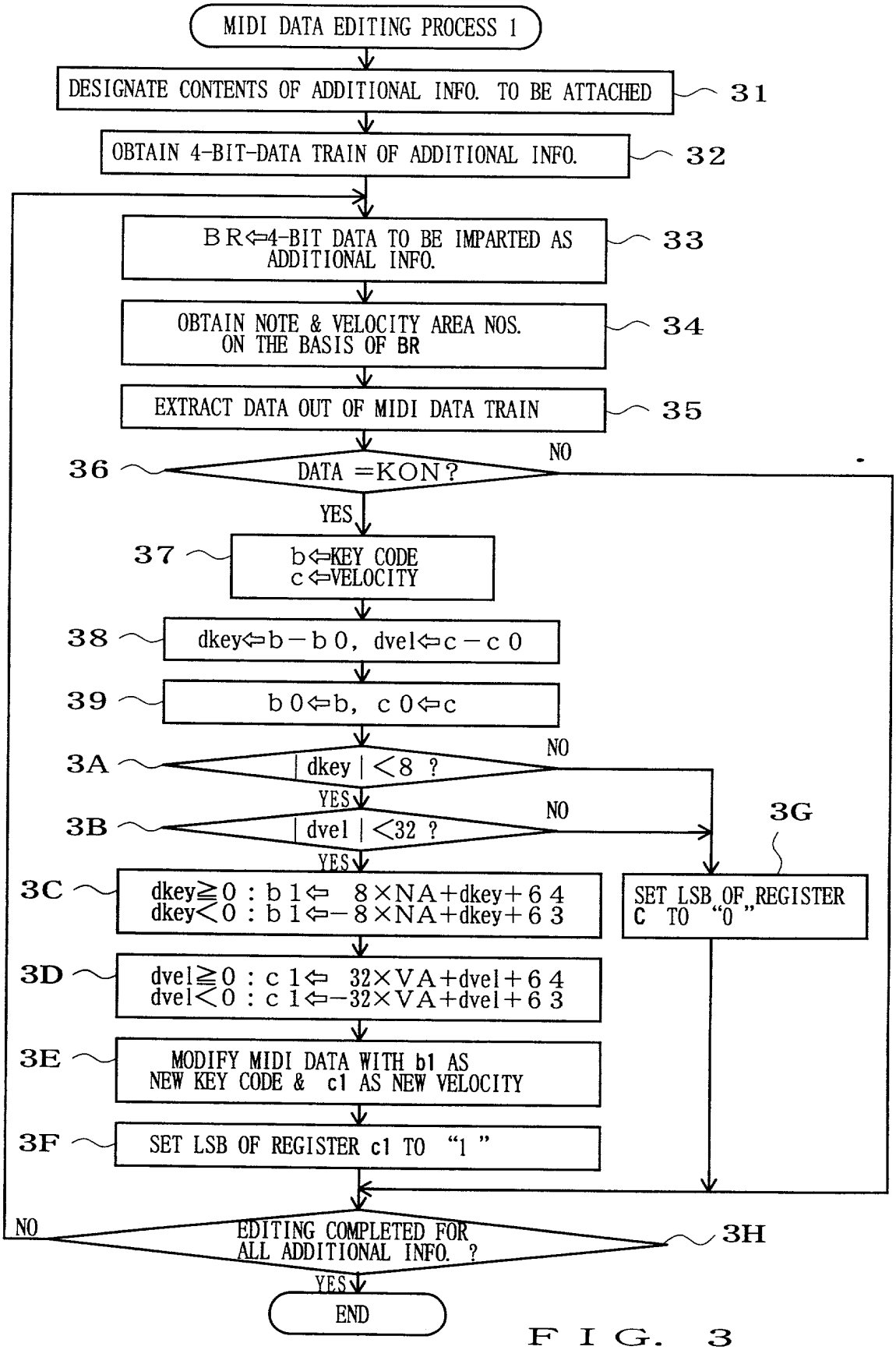
MIDI DATA EDITING PROCESS 1
DESIGNATE CONTENTS OF ADDITIONAL INFO. TO BE ATTACHED
31
OBTAIN 4-BIT-DATA TRAIN OF ADDITIONAL INFO.
32
BR⇐4-BIT DATA TO BE IMPARTED AS ADDITIONAL INFO.
33
OBTAIN NOTE & VELOCITY AREA NOS. ON THE BASIS OF BR
34
EXTRACT DATA OUT OF MIDI DATA TRAIN
35
36
DATA =KON?
NO
YES
37
b⇐KEY CODE
c⇐VELOCITY
38
dkey⇐b−b 0, dvel⇐c−c 0
39
b 0⇐b, c 0⇐c
3A
| dkey | <8 ?
NO
YES
3B
| dvel | <32 ?
NO
YES
3G
SET LSB OF „REGISTER C TO "0"
3C
dkey≧0 : b 1⇐ 8×NA+dkey+64
dkey<0 : b 1⇐−8×NA+dkey+63
3D
dvel≧0 : c 1⇐ 32×VA+dvel+64
dvel<0 : c 1⇐−32×VA+dvel+63
3E
MODIFY MIDI DATA WITH b1 AS NEW KEY CODE & c1 AS NEW VELOCITY
3F
SET LSB OF REGISTER c1 TO "1"
NO
EDITING COMPLETED FOR ALL ADDITIONAL INFO. ?
3H
YES
END

FIG. 3

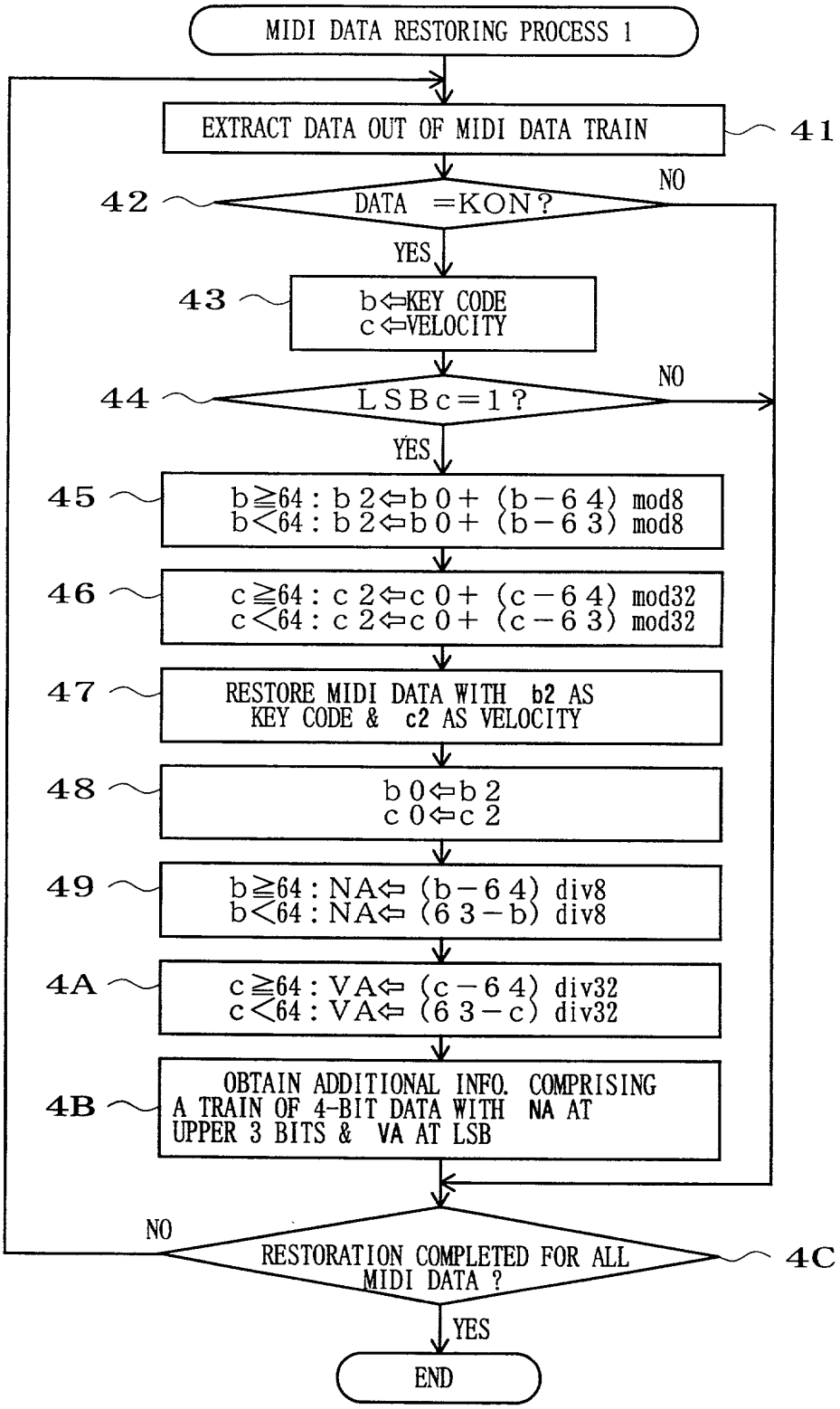
MIDI DATA RESTORING PROCESS 1
EXTRACT DATA OUT OF MIDI DATA TRAIN
41
42
DATA =KON?
NO
YES
43
b⇦KEY CODE
c⇦VELOCITY
44
LSBc=1?
NO
YES
45
b≧64 : b 2⇦b 0+ (b−64) mod8
b<64 : b 2⇦b 0+ (b−63) mod8
46
c≧64 : c 2⇦c 0+ (c−64) mod32
c<64 : c 2⇦c 0+ (c−63) mod32
47
RESTORE MIDI DATA WITH b2 AS
KEY CODE & c2 AS VELOCITY
48
b 0⇦b 2
c 0⇦c 2
49
b≧64 : NA⇦ (b−64) div8
b<64 : NA⇦ (63−b) div8
4A
c≧64 : VA⇦ (c−64) div32
c<64 : VA⇦ (63−c) div32
4B
OBTAIN ADDITIONAL INFO. COMPRISING
A TRAIN OF 4-BIT DATA WITH NA AT
UPPER 3 BITS & VA AT LSB
NO
RESTORATION COMPLETED FOR ALL
MIDI DATA ?
4C
YES
END

FIG. 4

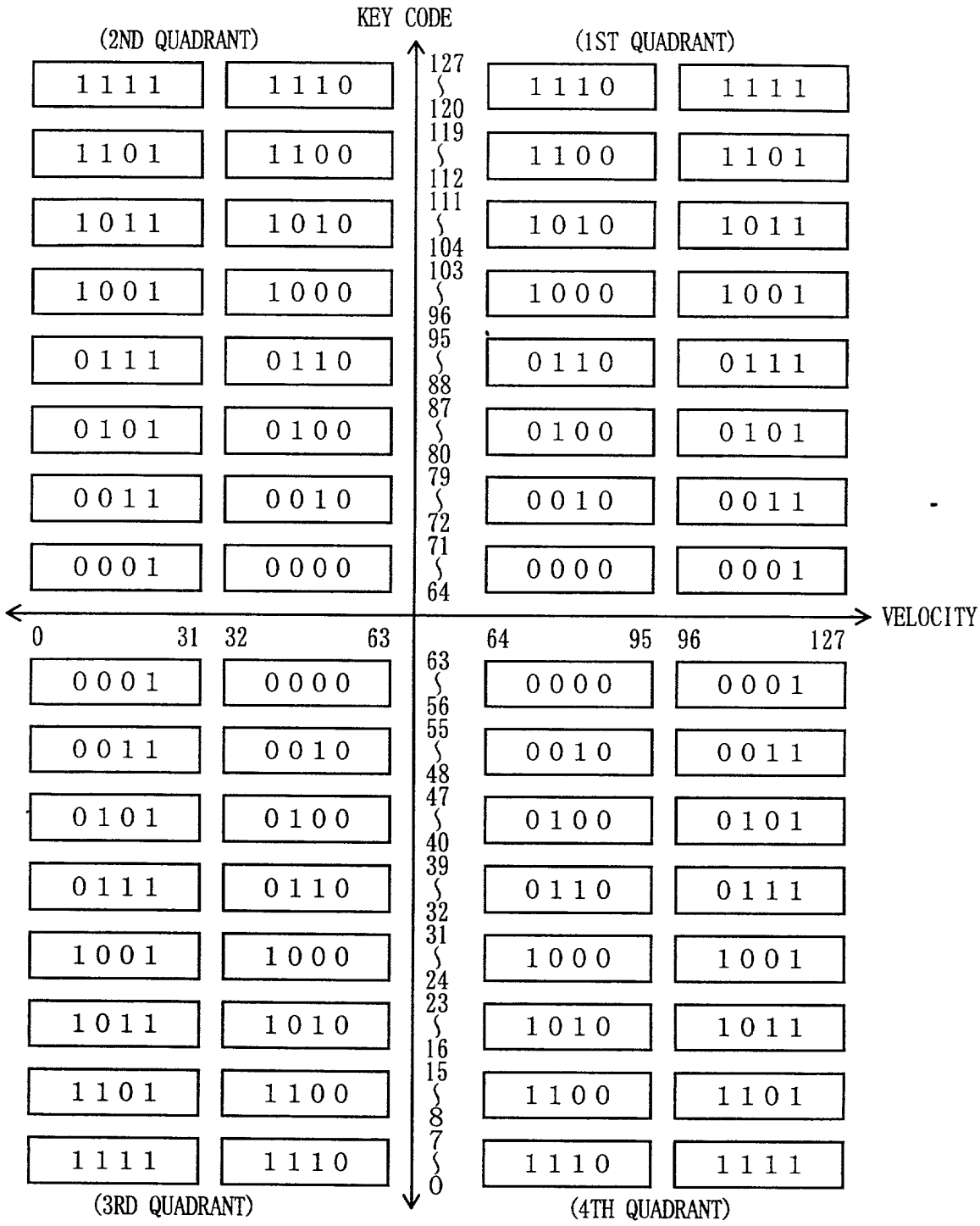
KEY CODE
(2ND QUADRANT)
(1ST QUADRANT)
(3RD QUADRANT)
(4TH QUADRANT)
VELOCITY
0
31
32
63
64
95
96
127
1111
1110
1101
1100
1011
1010
1001
1000
0111
0110
0101
0100
0011
0010
0001
0000
127 ~ 120
119 ~ 112
111 ~ 104
103 ~ 96
95 ~ 88
87 ~ 80
79 ~ 72
71 ~ 64
63 ~ 56
55 ~ 48
47 ~ 40
39 ~ 32
31 ~ 24
23 ~ 16
15 ~ 8
7 ~ 0

FIG. 5

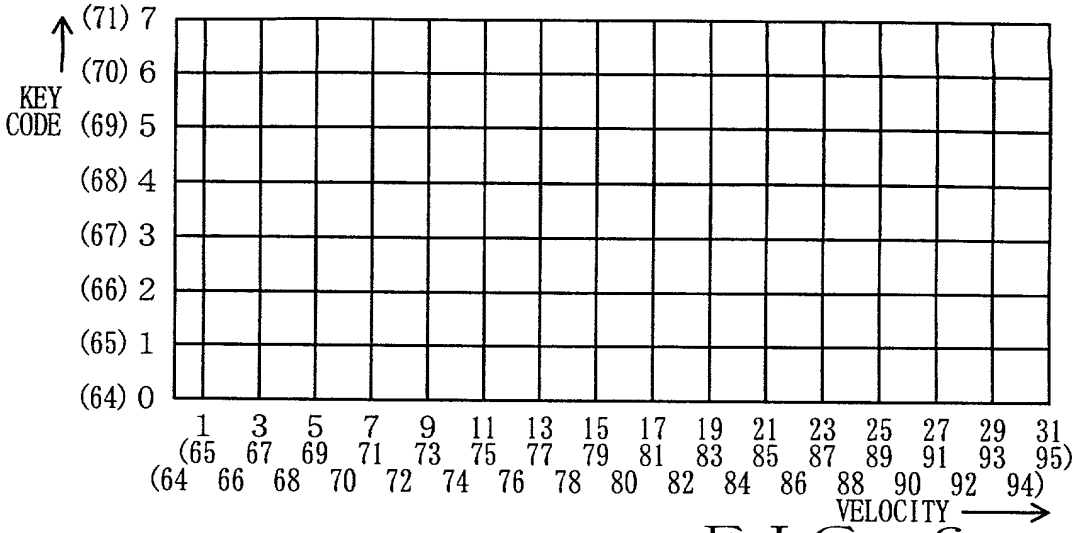

FIG. 6

4 BITS	4 BITS	8 BITS
ALGORITHM	COUNT	VALUE
MODIFY NOTE NO. OF KEY-ON DATA	NUMBER OF EVENTS TO BE MODIFIED	TRANSPOSE VALUE (MODIFIED NOTE VALUE)
REPLACE NOTE & VELOCITY OF KEY-ON DATA	NUMBER OF EVENTS TO BE MODIFIED	NONE
MODIFY INTERVAL DATA	NUMBER OF EVENTS TO BE MODIFIED	MODIFIED VALUE
MODIFY CHANNEL DATA OF KEY-ON DATA	NUMBER OF EVENTS TO BE MODIFIED	MODIFIED CHANNEL
OTHERS		

FIG. 7

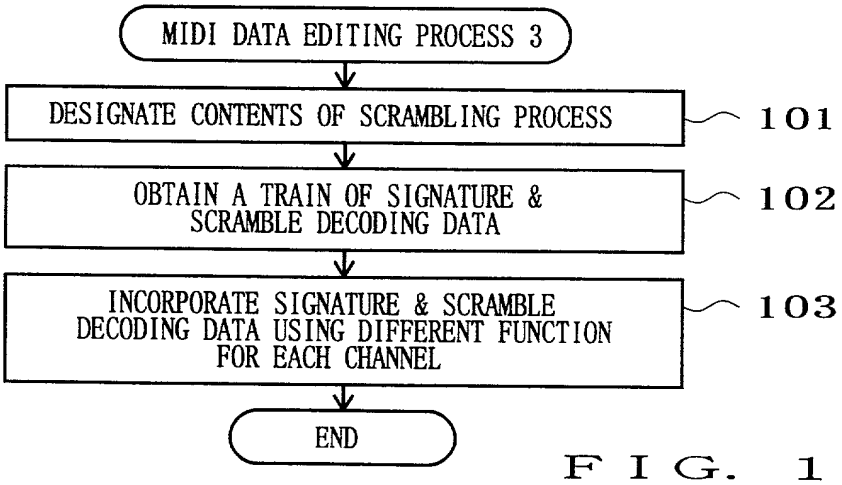

FIG. 10

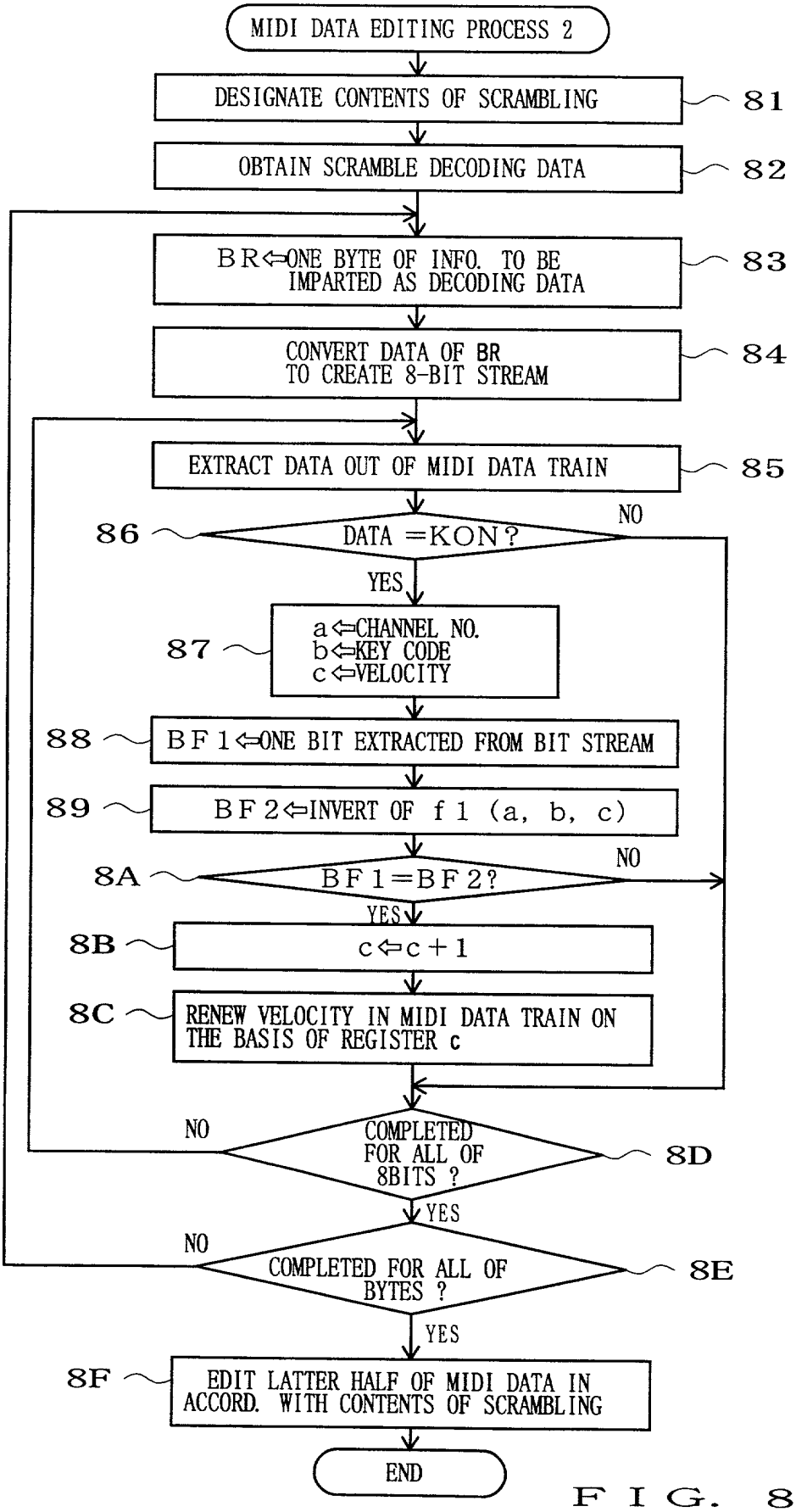
MIDI DATA EDITING PROCESS 2
DESIGNATE CONTENTS OF SCRAMBLING
81
OBTAIN SCRAMBLE DECODING DATA
82
BR⇦ONE BYTE OF INFO. TO BE IMPARTED AS DECODING DATA
83
CONVERT DATA OF BR TO CREATE 8-BIT STREAM
84
EXTRACT DATA OUT OF MIDI DATA TRAIN
85
86
DATA =KON?
NO
YES
87
a⇦CHANNEL NO.
b⇦KEY CODE
c⇦VELOCITY
88
BF1⇦ONE BIT EXTRACTED FROM BIT STREAM
89
BF2⇦INVERT OF f1 (a, b, c)
8A
BF1=BF2?
NO
YES
8B
c⇦c+1
8C
RENEW VELOCITY IN MIDI DATA TRAIN ON THE BASIS OF REGISTER c
NO
COMPLETED FOR ALL OF 8BITS ?
8D
YES
NO
COMPLETED FOR ALL OF BYTES ?
8E
YES
8F
EDIT LATTER HALF OF MIDI DATA IN ACCORD. WITH CONTENTS OF SCRAMBLING
END

FIG. 8

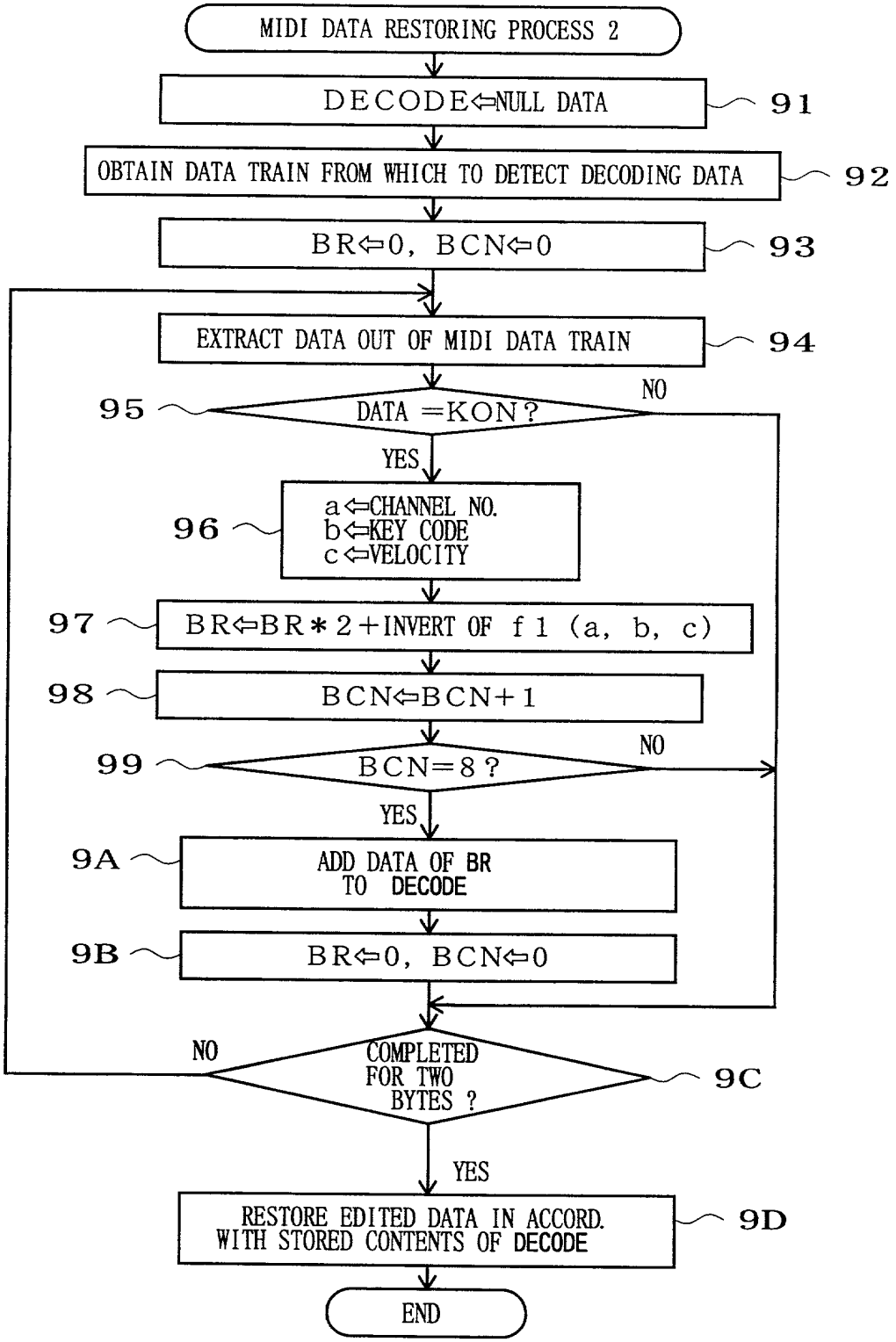
MIDI DATA RESTORING PROCESS 2
DECODE⇦NULL DATA
91
OBTAIN DATA TRAIN FROM WHICH TO DETECT DECODING DATA
92
BR⇦0, BCN⇦0
93
EXTRACT DATA OUT OF MIDI DATA TRAIN
94
95
DATA =KON?
NO
YES
96
a⇦CHANNEL NO.
b⇦KEY CODE
c⇦VELOCITY
97
BR⇦BR*2+INVERT OF f1 (a, b, c)
98
BCN⇦BCN+1
99
BCN=8?
NO
YES
9A
ADD DATA OF BR
TO DECODE
9B
BR⇦0, BCN⇦0
NO
COMPLETED
FOR TWO
BYTES ?
9C
YES
RESTORE EDITED DATA IN ACCORD.
WITH STORED CONTENTS OF DECODE
9D
END

FIG. 9

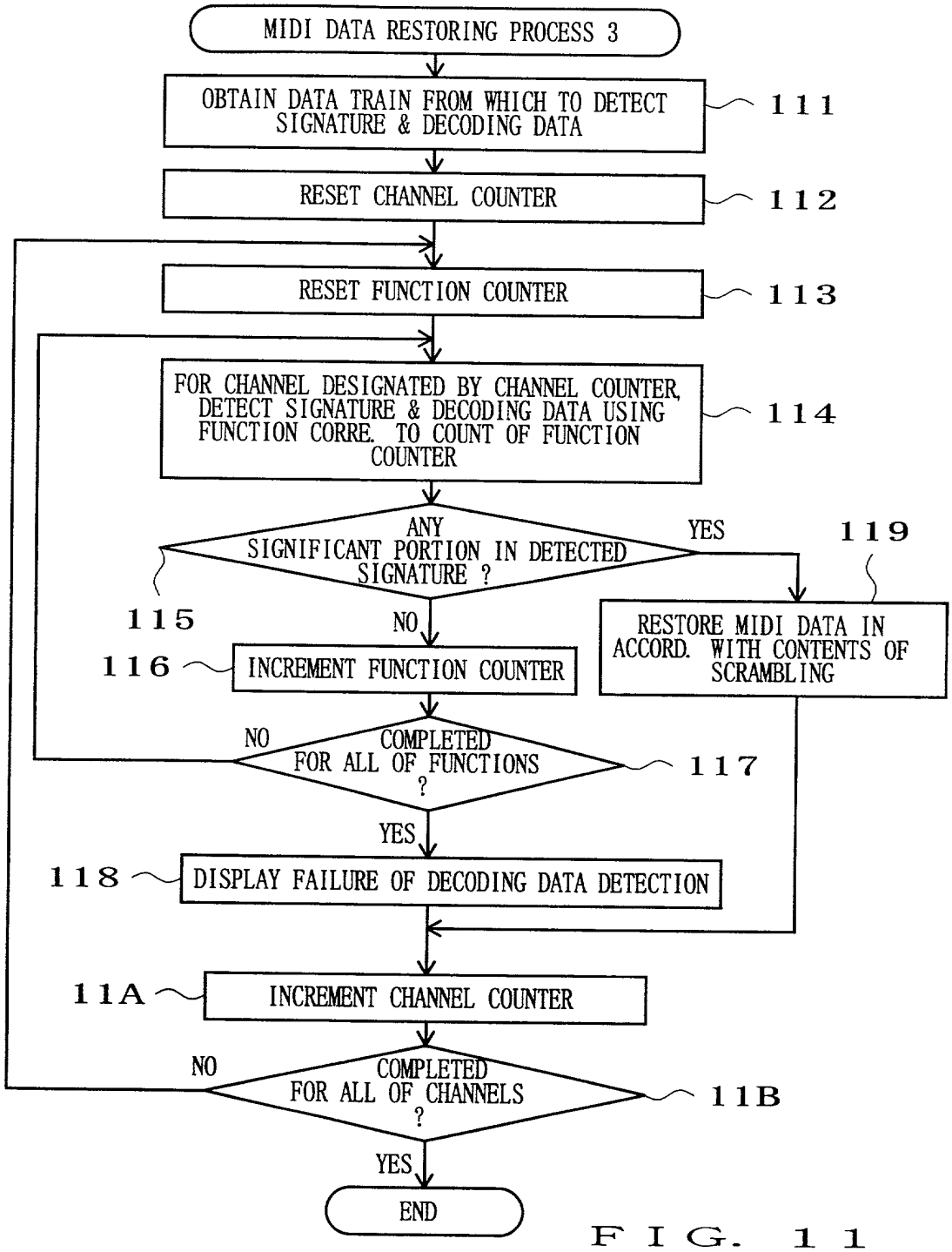
MIDI DATA RESTORING PROCESS 3
OBTAIN DATA TRAIN FROM WHICH TO DETECT SIGNATURE & DECODING DATA
111
RESET CHANNEL COUNTER
112
RESET FUNCTION COUNTER
113
FOR CHANNEL DESIGNATED BY CHANNEL COUNTER, DETECT SIGNATURE & DECODING DATA USING FUNCTION CORRE. TO COUNT OF FUNCTION COUNTER
114
ANY SIGNIFICANT PORTION IN DETECTED SIGNATURE ?
YES
119
115
NO
RESTORE MIDI DATA IN ACCORD. WITH CONTENTS OF SCRAMBLING
116
INCREMENT FUNCTION COUNTER
NO
COMPLETED FOR ALL OF FUNCTIONS ?
117
YES
118
DISPLAY FAILURE OF DECODING DATA DETECTION
11A
INCREMENT CHANNEL COUNTER
NO
COMPLETED FOR ALL OF CHANNELS ?
11B
YES
END

FIG. 11

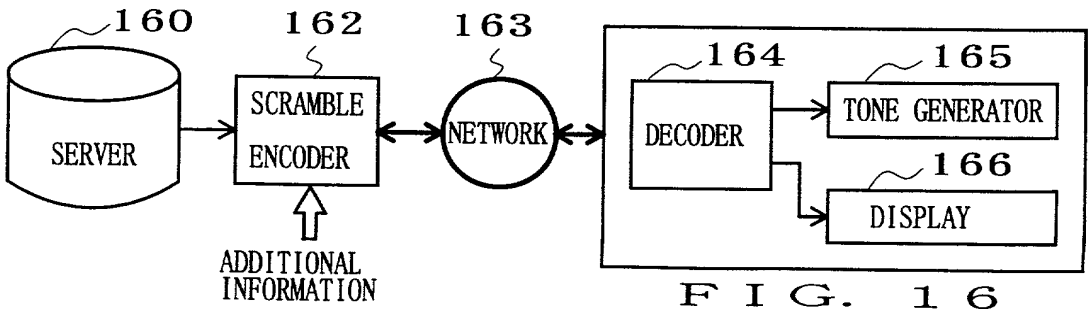
160
162
163
164
165
166
SERVER
SCRAMBLE ENCODER
NETWORK
DECODER
TONE GENERATOR
DISPLAY
ADDITIONAL INFORMATION

FIG. 16

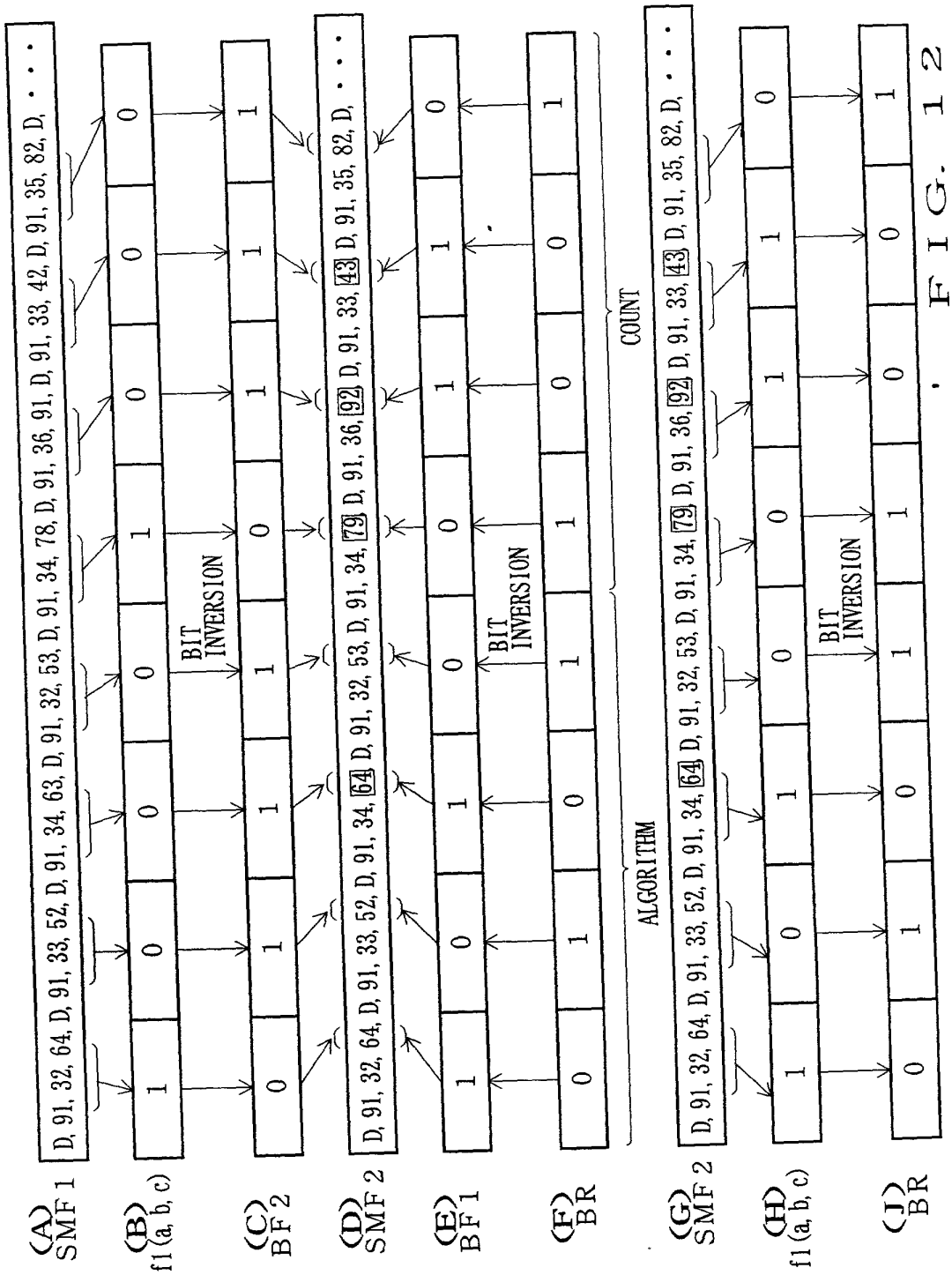
(A) SMF 1
D, 91, 32, 64, D, 91, 33, 52, D, 91, 34, 63, D, 91, 32, 53, D, 91, 34, 78, D, 91, 36, 91, D, 91, 33, 42, D, 91, 35, 82, D, • • •
(B) f1(a, b, c)
1 0 0 0 1 0 0 0
BIT INVERSION
(C) BF 2
0 1 1 1 0 1 1 1
(D) SMF 2
D, 91, 32, 64, D, 91, 33, 52, D, 91, 34, 64 D, 91, 32, 53, D, 91, 34, 79 D, 91, 36, 92 D, 91, 33, 43 D, 91, 35, 82, D, • • •
(E) BF1
1 0 1 0 0 1 0 1
BIT INVERSION
(F) BR
0 1 0 1 1 0 1 0
COUNT
ALGORITHM
(G) SMF 2
D, 91, 32, 64, D, 91, 33, 52, D, 91, 34, 64 D, 91, 32, 53, D, 91, 34, 79 D, 91, 36, 92 D, 91, 33, 43 D, 91, 35, 82, D, • • •
(H) f1(a, b, c)
1 0 1 0 0 1 0 1
BIT INVERSION
(J) BR
0 1 0 1 1 0 1 0

FIG. 12

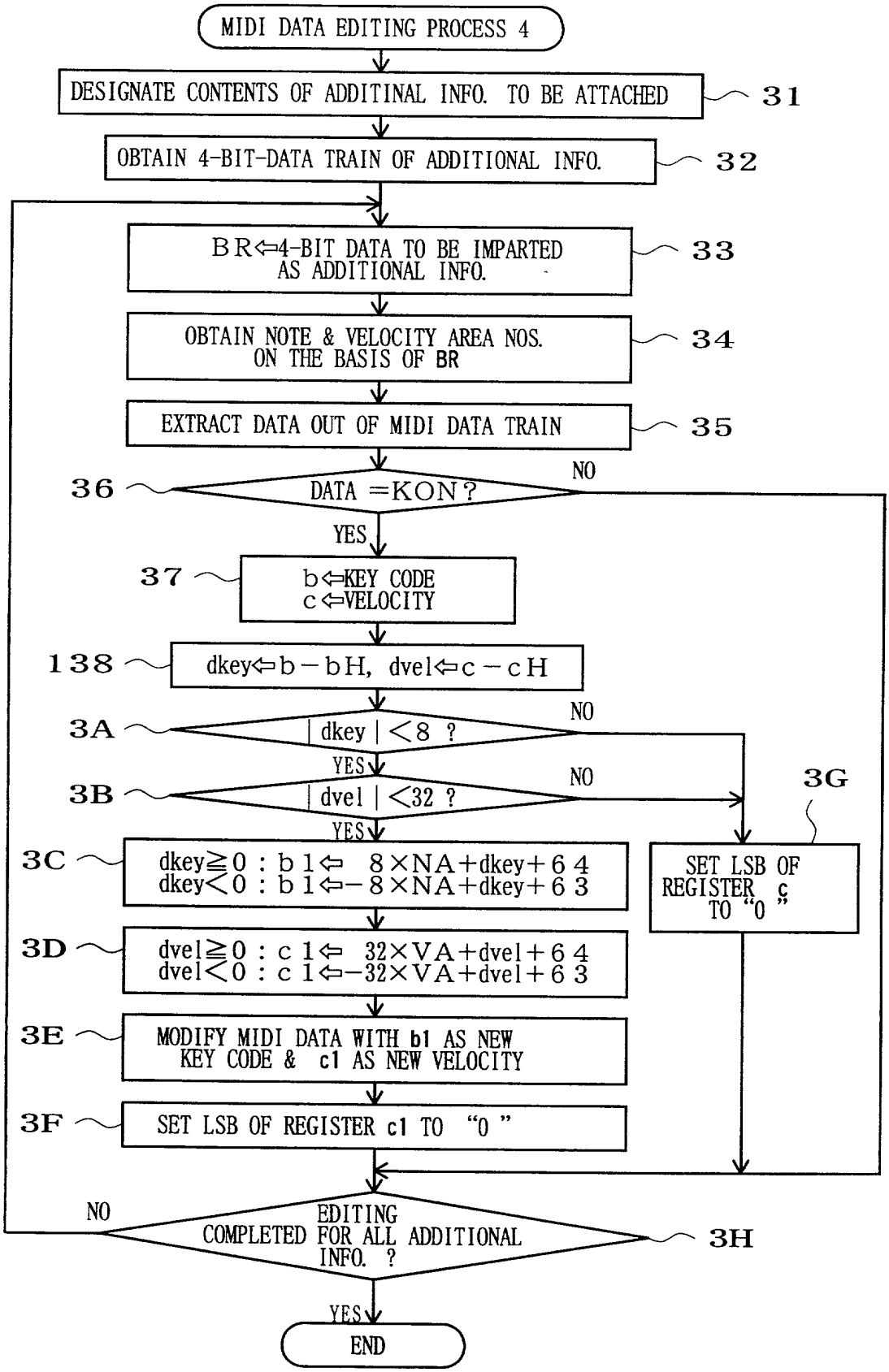
MIDI DATA EDITING PROCESS 4
DESIGNATE CONTENTS OF ADDITINAL INFO. TO BE ATTACHED
31
OBTAIN 4-BIT-DATA TRAIN OF ADDITIONAL INFO.
32
BR⇦4-BIT DATA TO BE IMPARTED AS ADDITIONAL INFO.
33
OBTAIN NOTE & VELOCITY AREA NOS. ON THE BASIS OF BR
34
EXTRACT DATA OUT OF MIDI DATA TRAIN
35
36
DATA =KON?
NO
YES
37
b⇦KEY CODE
c⇦VELOCITY
138
dkey⇦b−bH, dvel⇦c−cH
3A
| dkey | <8 ?
NO
YES
3B
| dvel | <32 ?
NO
YES
3G
SET LSB OF REGISTER c TO "0"
3C
dkey≧0 : b1⇦ 8×NA+dkey+64
dkey<0 : b1⇦−8×NA+dkey+63
3D
dvel≧0 : c1⇦ 32×VA+dvel+64
dvel<0 : c1⇦−32×VA+dvel+63
3E
MODIFY MIDI DATA WITH b1 AS NEW KEY CODE & c1 AS NEW VELOCITY
3F
SET LSB OF REGISTER c1 TO "0"
NO
EDITING COMPLETED FOR ALL ADDITIONAL INFO. ?
3H
YES
END

FIG. 13

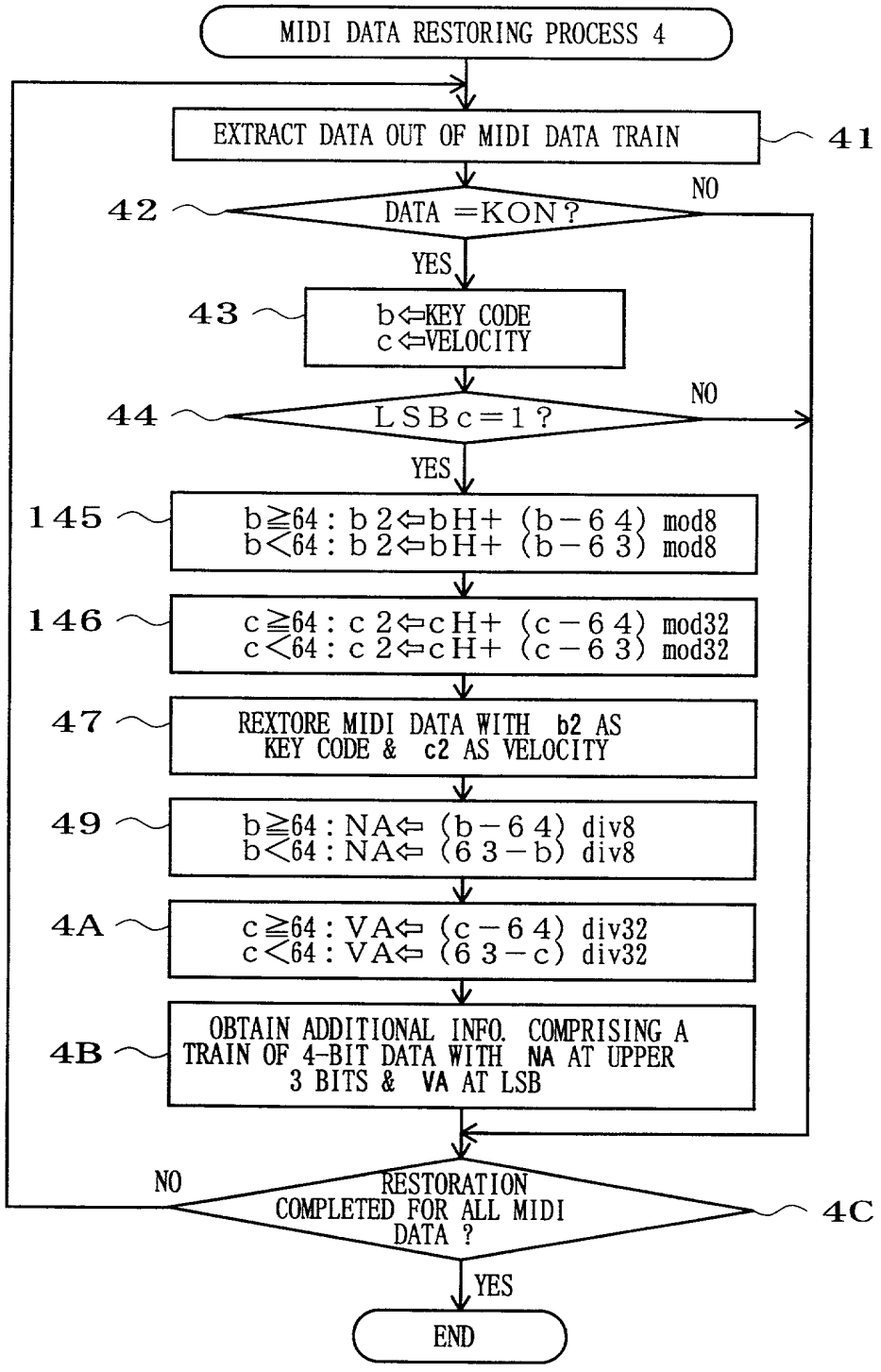

FIG. 14

0605268A2 1 >
EP 1 605 268 A2

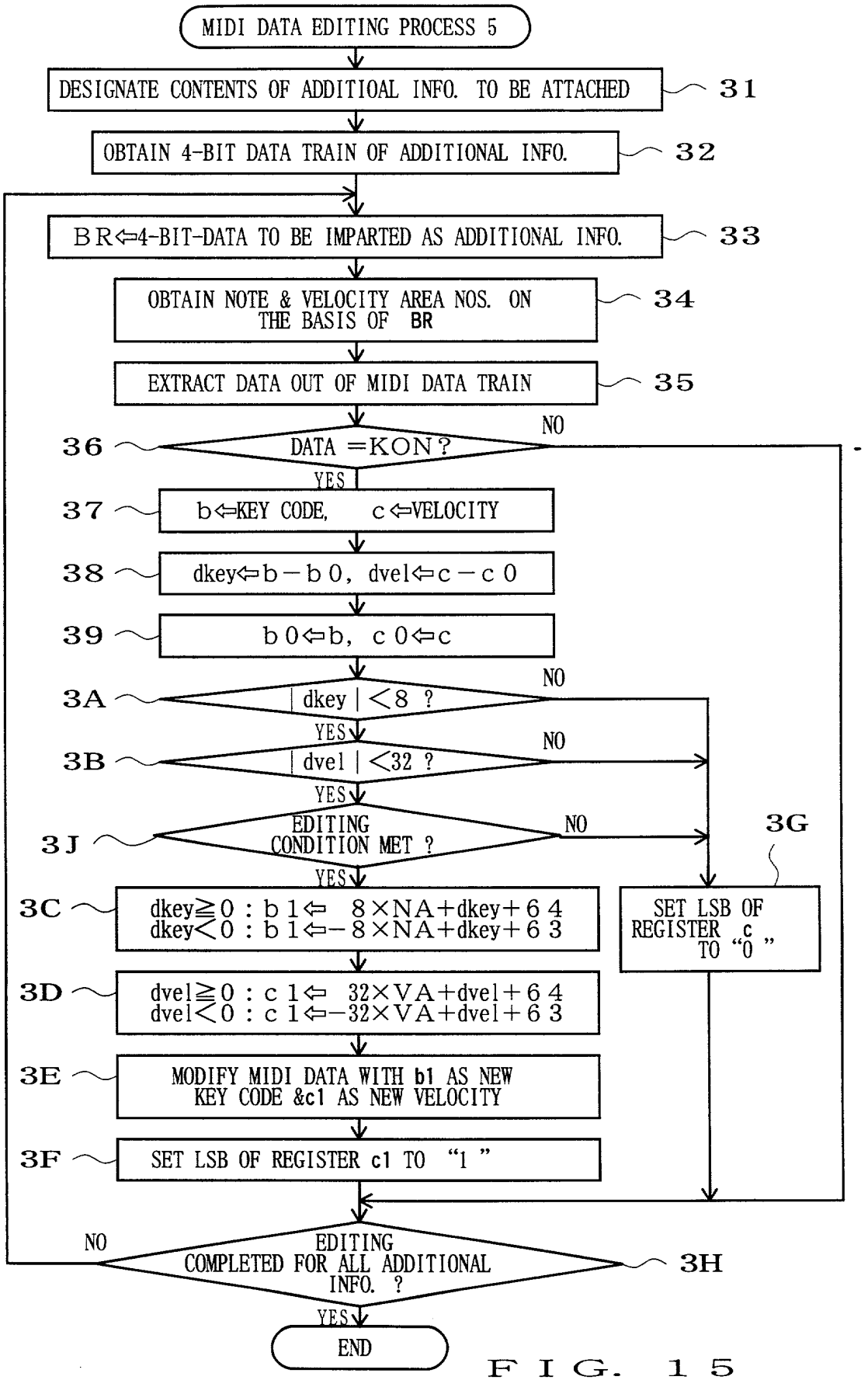
MIDI DATA EDITING PROCESS 5
DESIGNATE CONTENTS OF ADDITIOAL INFO. TO BE ATTACHED
31
OBTAIN 4-BIT DATA TRAIN OF ADDITIONAL INFO.
32
BR⇦4-BIT-DATA TO BE IMPARTED AS ADDITIONAL INFO.
33
OBTAIN NOTE & VELOCITY AREA NOS. ON THE BASIS OF BR
34
EXTRACT DATA OUT OF MIDI DATA TRAIN
35
36
DATA =KON?
NO
YES
37
b⇦KEY CODE, c⇦VELOCITY
38
dkey⇦b−b0, dvel⇦c−c0
39
b0⇦b, c0⇦c
3A
|dkey|<8 ?
NO
YES
3B
|dvel|<32 ?
NO
YES
3J
EDITING CONDITION MET ?
NO
YES
3G
SET LSB OF REGISTER c TO "0"
3C
dkey≧0 : b1⇦ 8×NA+dkey+64
dkey<0 : b1⇦−8×NA+dkey+63
3D
dvel≧0 : c1⇦ 32×VA+dvel+64
dvel<0 : c1⇦−32×VA+dvel+63
3E
MODIFY MIDI DATA WITH b1 AS NEW KEY CODE &c1 AS NEW VELOCITY
3F
SET LSB OF REGISTER c1 TO "1"
NO
EDITING COMPLETED FOR ALL ADDITIONAL INFO. ?
3H
YES
END

FIG. 15